

[illegible]

ERDC/CERL TN-00-4 November 2000

Problem:

Balancing multiple levels of users and their map requirements to produce a useful and economical vegetation map poses a difficult task for installation land managers. It may be difficult to articulate a single user's requirements and harder yet to resolve multiple user requirements, which may pull in different directions. User requirements need to be matched to map requirements including:

- The usual intent of a vegetation map is to supply an inventory of plant communities including their location, extent, geographical distribution in the landscape, relationship to other landscape features, and a description of selected characteristics. With the growth of computing techniques and advances in remote sensing, modeling, and sampling theory, a vegetation map can now possess a great deal of sophistication. Further, map information is no longer valuable to a only a few, but can be shared, manipulated, and presented to serve many different clients, each with their own requirements for map detail, resolution, and information. Because of the importance of maps, satisfaction with the product is critical. The individuals who will be using the maps must be proactive in defining the uses of the maps and their associated databases.

Categories of Users and Examples of Activities or Applications of Vegetation Information

- ◆ NEPA documentation
- ◆ INRMPs
- ◆ Installation master planning
- ◆ Ecosystem management and restoration, biodiversity protection

Excerpted from Table 2.A-1 of the *Guidelines for Mapping Vegetation on Army Installations*



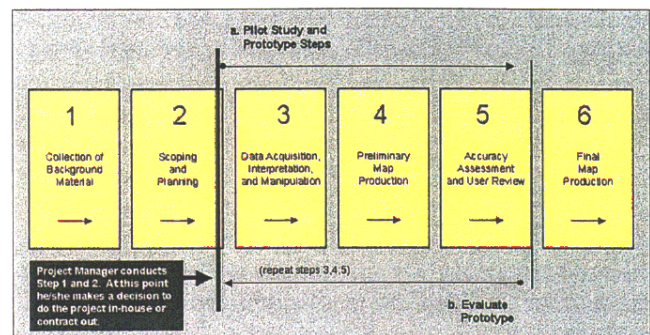
Multi-tiered Vegetation Mapping

Approach:

Multi-tiered vegetation mapping is an effort by the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC), sponsored by the Army Environmental Center, that defines an approach and a set of tools used to develop economical vegetation maps for multiple installation users. It focuses on the map development process as a decision framework that must be addressed by the project manager to ensure a successful resulting map. The framework is described in a document produced by ERDC entitled *Guidelines for Mapping Vegetation on Army Installations*.

that may be encountered. At this point, the project manager must decide whether to conduct the project in-house or contract out certain activities. Subsequent steps in the process guide the project manager through data acquisition and pilot project phases before embarking on full-scale final map development.

Vegetation Mapping Process



This process addresses six major questions that need to be made in any mapping project:

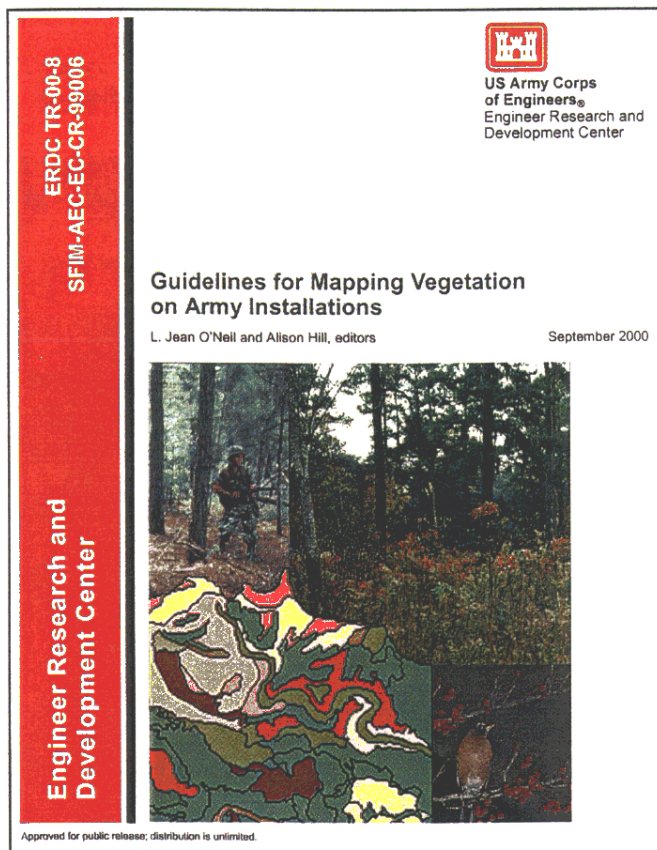
1. What are the goals and objectives of the project?
2. What will be the form and format of the products?
3. How much and what work will be contracted?
4. Which mapping approach and data standards should be used?
5. Will tradeoffs of user needs and resources be necessary?
6. Will the final product meet the specifications of the users?

By following the *Guidelines*' process, all six questions can be addressed. This helps to focus the project, identify milestones, and assist in making process decisions.

Solution:

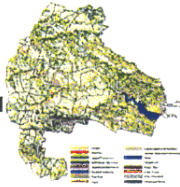
Fort Hood, Texas Vegetation Map

The applicability and usefulness of the *Guidelines* document and its vegetation mapping process was demonstrated at Fort Hood, Texas as a part of the Corps of Engineers Land Management System (LMS). A vegetation map was developed using the *Guidelines* as a model for five user groups including the training program, threatened and endangered species management, plant succession modeling, carrying capacity modeling, and the soil erosion program. The resultant map covered 220,000 acres of vegetation and contained 11 vegetation classes and 5 additional classes for windrows, hardscape, and urban areas. The overall map accuracy was 81%.



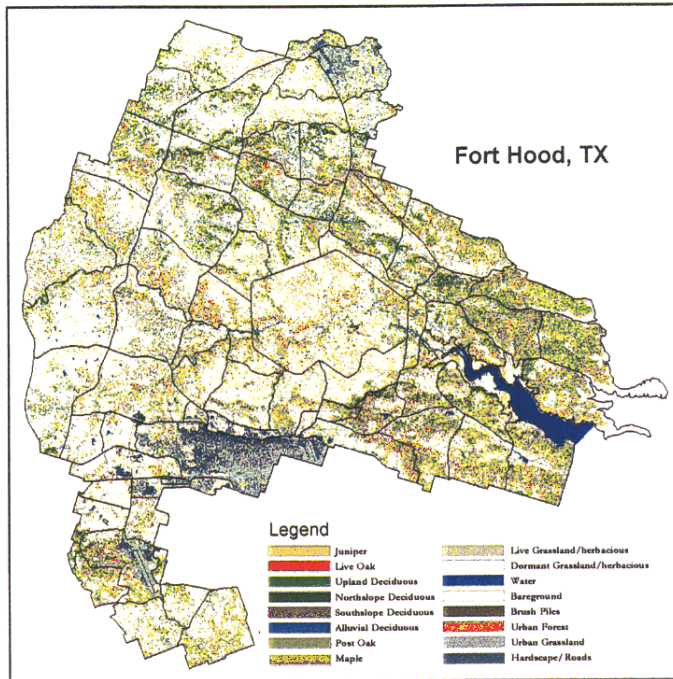
Mapping Process

The *Guidelines* document provides a useful framework for completing vegetation maps and is an especially valuable tool for installation land managers who do not have previous vegetation mapping experience. The *Guidelines* begin with a scoping and planning phase, the most critical phase of any mapping project. It sets the tone, goals, and approach for the entire project and identifies possible tradeoffs and solutions to problems



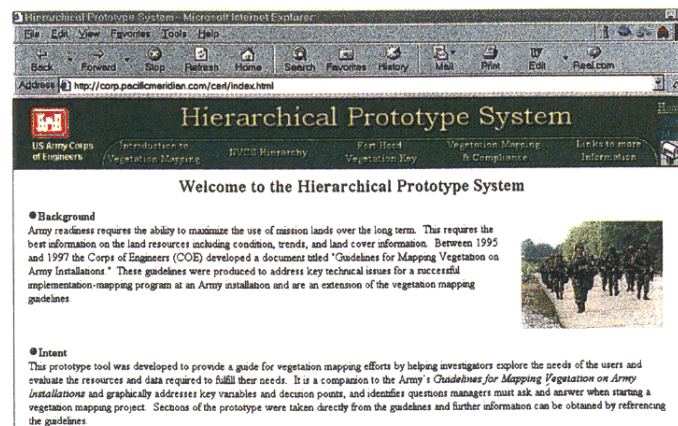
Multi-tiered Vegetation Mapping

Fort Hood Vegetation Map



Hierarchy Tool

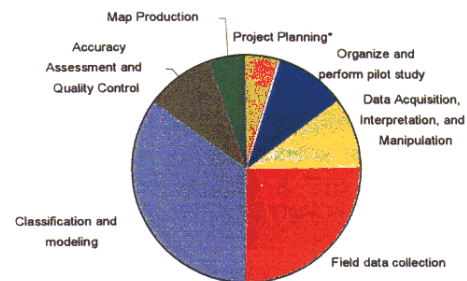
In addition to the mapping process, the multi-tiered vegetation mapping effort developed several additional tools to aid installation land managers in their development of useful vegetation maps. The hierarchy tool assists in understanding the NVCS and how this standard should be applied to each mapping project. It is a web-based system that explains how the NVCS is constructed and how a user should apply the standard. In addition, it provides an explanation of what vegetation maps look like at each level of the NVCS hierarchy and how mapped vegetation at each level can provide answers to questions by users.



Vegetation Mapping Cost Tracking and Analysis

The selection of mapping parameters has a direct effect on the cost of different mapping activities. Since the combination of these parameters influences the total cost to complete a mapping project, it is imperative that they be identified during the project planning phase.

Resource Consumption by Activity



As shown in the figure above, certain relationships that drive the cost of mapping projects can be identified, quantified, and modeled. With a large database of cost data, project managers could use this information to estimate project costs for each activity based on resource costs and mapping parameters. They could also conduct "what-if" analyses to quantify the tradeoffs between project costs and mapping parameters that may be affected by management decisions. This is another way in which the project manager can ensure that the final map meets the needs of the end users. The tracking sheet below allows the manager to itemize and document activity costs by job class.

Tasks	Days	#People	Expertise Required	Total Cost	N/A
Collection of Existing Information					
Reference Material (Literature Review)					
Collection Material from AOI					
Existing Data					
Digital and hard copy maps					
Collect imagery and photography of AOI					
Consultation with Experts					
Information gathering and team development					
Identify needs (equipment, personnel, etc)					
Scoping and Planning					
Synthesis of literature and background material					
Establish Objectives					
Develop and review SOW					
Determine available resources (personnel, equipment, etc.)					
Determine specifications and costs					
Hold a planning meeting					
Finalize Specifications (mapping parameters)					
Develop and review POW					
Preparation for mapping					
Plan accuracy assessment					
Review Federal Standards					
Evaluate options for obtaining reference data					
Establish criteria and priorities					
Evaluate tradeoffs btwn. existing sources and new data					
Establish protocols for collection reference data					
Determine number of samples and sample placement					



Multi-tiered Vegetation Mapping

For information about the *Guidelines for Mapping Vegetation on Army Installations*:

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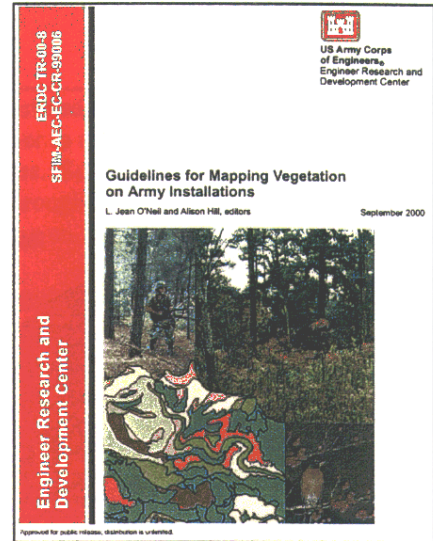
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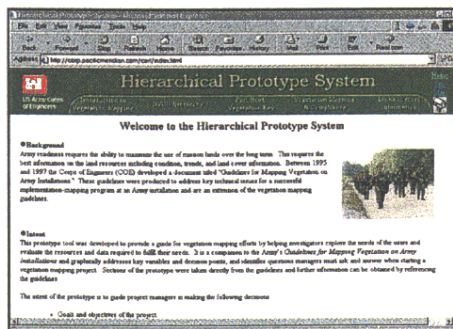
Obtain a cdrom:

Call the Army Environmental Center at 1-800-872-3845



For information about:

- Vegetation Map demonstration project at Fort Hood, Texas
- Hierarchy Tool
- Vegetation Mapping Cost Analysis and Tracking



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Task	Step	Priority	Supervisor	Initial Date	Final Date
Collection of Existing Information					
Reference Material (Literature Review)					
Collect Material from AGS					
Existing Data					
Digital and hard copy maps					
Collect imagery and photography of AOI					
Consultation with Experts					
Information gathering and team development					
Identify needs (equipment, personnel, etc.)					
Develop and review SOW					
Determine available resources (personnel, equipment, etc.)					
Determine specifications and costs					
Hold a planning meeting					
Finalize Specifications (mapping parameters)					
Develop and review SOW					
Preparation for mapping					
Plan accuracy assessment					
Review Federal Standards					
Evaluate options for obtaining reference data					
Establish criteria and priorities					
Evaluate tradeoffs between existing sources and new data					
Establish protocols for collection reference data					
Determine number of samples and sample placement					

Find Vegetation Mapping Information on DENIX under the LMS program at:
<http://www.denix.osd.mil/denix/Public/Library/LMS/lms.html>